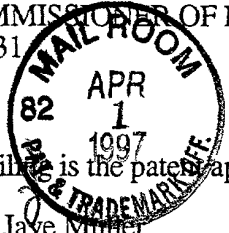


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Sir:

Transmitted herewith for filing is the patent application of:

Inventors: Jack Rieley & Jaye Munier

For: Method & Apparatus for Transmission and Retrieval of Facsimile and Audio Messages Over A Circuit or Packet Switched Network

Enclosed are:

- XXX Three (3) sheets of Formal Drawings including three (3) figures.
- _____ An Assignment of the invention to: _____
- _____ A Declaration and Power of Attorney.
- _____ A Verified Statement to establish Small Entity Status under 37 CFR 1.9 and 37 CFR 1.27.

The Filing Fee has been calculated as shown below:

For:	(Col. 1)	(Col.2)	SMALL ENTITY		OTHER THAN A SMALL ENTITY	
	No. Filed	No. Extra	RATE	FEE	RATE	FEE
Basic Fee:	-	-	-	\$385.00	-	\$770.00
Total Claims:	1-20	-0-	x \$11.00		x \$22.00	-0-
Indep. Claims:	1-3	-0-	x \$40.00		x \$80.00	-0-
<input type="checkbox"/> Multiple Dep. Claim(s) Presented			+ \$130.00		+ \$260.00	-0-
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- XXX A check in the amount of \$770.00 to cover the filing fee is enclosed.
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- XXX The Commissioner is hereby authorized to charge payment of the following fees associated with this communication or credit any overpayment to our Deposit Account No. 02-2666. A copy of this sheet is enclosed.
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 - XXX Any extension or petition fees under 37 CFR 1.17.
 - XXX Any filing fees under 37 CFR 1.16 for presentation of extra claims.

Respectfully submitted,

BLAKELY SOKOLOFF, TAYLOR & ZAFMAN LLP.

Dated: 3/31/97

By: [Signature]

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BACKGROUND OF THE INVENTION

Field of the Invention

The present invention relates to the field of message receipt/transmission and delivery using computer networks.

5 Specifically, the present invention relates to the subject of facsimile and voice transmission and retrieval over circuit/packet switched voice/data networks.

Description of Related Art

10 Voice and data communications systems such as the public switched telephone network (PSTN) are currently used to transfer image and text data transmitted by facsimile ("fax") machines in addition to the normally carried voice traffic. These faxed images are usually transmitted through the PSTN and received for printout or storage of the image on a destination fax machine or
15 computer for the use by the recipient. Since the destination machine has typically been a fax, computer, printer or other such large capacity storage and output device, there has not been a need to compress the fax significantly for the destination output device. Furthermore, as the traditional destination has been
20 either a full size print-out, computer monitor or mass storage media, no attempt has been made to facilitate the delivery of fax messages using other methods so as not to require the recipient to be physically close to the device which is coupled to the telephone line in order to receive the fax message.

For example, where user A has a fax machine connected to the PSTN using a telephone line with a number "XXX-YYY-ZZZZ" (where "XXX" represents the area code of the number, "YYY" the prefix of the number, and "ZZZZ" the remainder of the number), in order for user A to view a received fax message, user A must be physically located in the same area as the fax machine.

Similarly, audio messages are stored on fixed destination devices such as answering machines and "voice-mail" systems. To retrieve such audio messages, a recipient would either have to dial into the destination device or physically activate the playback of audio messages through manipulation of the controls of an answering machine.

Thus, the ability to access both voice and fax messages from additional locations which would not require a user to either (1) be physically stationed near the receiving fax machine; or (2) to have to manually call a device to retrieve audio messages; would be desirable.

In addition, as a sender currently has to call or fax directly to the destination phone or fax machine, the sender incurs additional charges imposed by one or more telephone companies handling the call. Depending on the length of the fax or audio message, the telephone company charges can be substantial as calls are billed based on the time connected.

Hence, to be able to provide a sender with multiple phone numbers to which to send a message would be desirable, allowing the sender to choose the number which would be closest, and, thus, the least expensive, to dial into.

SUMMARY OF THE INVENTION

To provide for the receipt and transmission of audio and fax information by a first user over a circuit switched network such as the PSTN to a second user over a packet switched network such as the Internet, a communications server is connected both to the circuit switched network and a packet switched network.

The communications server contains resources to receive and process incoming audio and facsimile calls from the circuit switched network into a format suitable for transmission over the packet switched network to the second user's address. In addition, a link is first determined between the second user's address on the circuit switched network and the second user's address on the packet switched network, and then an appropriate route to the second user's address on the packet network is determined. With the system being maintained in a distributed and redundant fashion, reliable receipt and transfer of all messages is ensured.

Thus, this electronic messaging system allows for the transfer of messages such as facsimile and audio messages from the circuit switched network to be collected and routed over the packet switched network.

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 is a system diagram of a network configured pursuant to a preferred embodiment of the present invention containing a message server.

5 **Figure 2** is a block diagram illustrating the message server configured in accordance with the preferred embodiment of the present invention.

Figure 3 is a flow diagram illustrating the operations of the preferred embodiment of the present invention.

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DETAILED DESCRIPTION OF THE INVENTION

The present invention provides a method and apparatus for allowing the receipt and transmission of audio and fax information between a circuit switched network and a packet switched network.

For purposes of explanation, specific embodiments are set forth to provide a thorough understanding of the present invention.

However, it will be understood by one skilled in the art, from reading this disclosure, that the invention may be practiced without these details. Further, although the present invention is described through the use of circuit switched and packet switched networks, most, if not all, aspects of the invention apply to all networks in general. Moreover, well-known elements, devices, process steps and the like are not set forth in detail in order to avoid obscuring the present invention.

Figure 1 contains a block diagram illustrating a system configured in accordance with a preferred embodiment of the present invention containing a communications server 150 connected to a circuit switched network 130 and a wide area network (WAN) 180. In the preferred embodiment, circuit switched network 130 is a circuit switched network such as the PSTN while WAN 180 is a packet switched network such as the Internet. It is to be noted that circuit switched network 130 can also be a network such as the generalized switched telephone network (GSTN), which encompasses PSTN networks, cellular telephone networks, and the other networks with which they are in communication.

Communications server 150 is connected to circuit switched network 130 via a switch 140 and to WAN 180 through the use of a router 185. As described in further detail below, in a preferred embodiment, switch 140 and router 185 are interfaced to communications server 150 using two separate hardware interfaces. In an alternate embodiment, switch 140 and router 185 can be interfaced to communications server 150 through the use of one hardware unit.

Connected to circuit switched network 130 is both a telephone unit 110 and a facsimile unit 120. Telephone unit 110 is a standard telephone capable of converting audio signals into electrical signals suitable for transmission over circuit switched network 130. Similarly, facsimile unit 120 is a standard facsimile machine capable of transmitting and receiving facsimile messages over circuit switched network 130. Each of these devices can be connected to circuit switched network 130 using either wired or wireless technology.

Connected to WAN 180 is a database server 195, a system management unit 197, a mail server 160, and a client 190. Each of these systems communicate with each other and with communications server 150 via WAN 180 using such protocols such as simple network management protocol (SNMP) and hyper-text transport protocol (HTTP)--packetized using a protocol such as the transmission control protocol/internet protocol (TCP/IP).

In the preferred embodiment, each one of database server 195, system management unit 197, mail server 160, and client 190, are stand-alone computers or workstations containing the hardware and

software resources to enable the operation of the present invention. In alternate embodiments, the functions provided by each one of database server 195, system management unit 197, mail server 160, and client 190, are provided by any number of computer systems.

In the preferred embodiment, mail server 160 is a server providing e-mail receipt and transmission using a protocol such as the simple mail transfer protocol (SMTP) and post office protocol (POP). Moreover, client 190 is configured to be able to communicate over WAN 180 using SMTP or POP in order to retrieve e-mail from mail server 160 or another suitably configured server.

System management unit 197 communicates with communications server 150 to monitor: (1) the processes on communications server 150; (2) the status of the trunk line connected to communications server 150; and (3) the connection between the various servers connected to WAN 180. As described below, if any processes on communications server 150 or connection to the circuit switched network 130 is interrupted, system management unit 197 can allocate resources, or cause the re-routing of a call or message via one or more redundant resources or connections, ensuring that the call or message is routed to the final destination.

Communications server 150 contains user data needed to receive and route incoming messages received from circuit switched network 130. The same information is also stored on database server 195. In the preferred embodiment, communications server 150 stores an inbound address, a set of final destination addresses; and an account status for each user. The inbound

address corresponds to the telephone number assigned to the user. As further discussed below, the inbound address is the number that a message sender dials on telephone unit 110 or facsimile unit 120 to leave a message for the user. The set of final destination
5 address contain one or more e-mail addresses where the user account status information indicates whether the inbound address is either active and or inactive--i.e, whether the user is able to receive messages using the system.

Database server 195 stores a duplicate copy of the inbound
10 address, the set of final destination addresses; and the account status for each user. Database server 195 also stores additional information for each user such as mailing address and billing information which are not used in the operation of the present invention but are note herein for completeness only. Thus, the
15 information that is stored on communications server 150 is a subset of the information that is stored on database server 195, and if communications server 150 were to become inoperable or otherwise unable to handle incoming messages, database server 195 can configure another communications server to accept those calls.

20 In the preferred embodiment, system management unit 197 is responsible for monitoring the status of communications server 150 and re-assigning the users being handled by communications server 150 if communications server malfunctions or becomes overloaded with incoming calls. In the former case, system management unit
25 197 would re-assign all users being handled by communications server 150 to another communications server. In the latter case, system mananagment unit 197 would only off-load the only those

incoming calls for which communications server 150 does not have the available resources to process.

Figure 2 is a block diagram of communications server 150 configured in accordance with the preferred embodiment of the present invention, containing a processor 151 coupled to a memory subsystem 153 through the use of a system bus 155. Also coupled to system bus 155 is a network interface 156; a trunk interface 152; and a set of fax/voice processing resources 154. Set of fax/voice processing resources 154 and trunk interface 152 are also coupled to a bus 157.

Bus 157 is a bus that supports time division multiplex access (TDMA) protocols to optimize the flow of real time traffic between set of fax/voice processing resources 154 and trunk interface 152.

Memory subsystem 153 is used to store information and programs needed by communications server 150. The functioning of memory subsystems in computer design are well known to those of ordinary skill in the art and thus will not be further discussed herein.

In the preferred embodiment, trunk interface 152 is a trunk line interface, such as a T-1 or E-1 line, to switch 140 and can handle up to 24 channels of communications. Trunk line signaling is well known to those of ordinary skill in the art of telecommunication and thus will not be further discussed herein except as necessary for describing the invention.

Set of fax/voice processing resources 154 are made up of multiple fax/voice processing cards. Each of these processing cards contain processing units which are capable of receiving and

transmitting facsimiles according to established protocols, and which are capable of digitizing voice or other audio data, also according to established protocols. In the preferred embodiment, there are three fax/voice processing cards in set of fax/voice processing resources 154, each fax/voice processing card containing eight processing units capable of handling a channel from trunk interface 152. Thus, communications server 150 can communicate on twenty-four channels concurrently.

The storage of destination addresses on both circuit switched network 130 and WAN 180 is controlled by a database located either on communications server 150 or on database server 195. Keeping this information separate from communications server 150 allows communications server 150 to be a resource that can be allocated on demand. Hence, a number of communications servers could be used, along with one or more database servers, to allow a fully redundant and scalable system. In addition, system management unit 197 monitors the status and connection of all the communication and database servers.

Figure 3 is a flow diagram illustrating the operations of the preferred embodiment of the present invention when a call originating from a source on the circuit switched network 130. For example, either telephone unit 110 or facsimile unit 120 can initiate the call.

In block 400, an incoming call signal is received by communications server 150 from switch 140. The incoming call signal is initiated by telephone unit 110 or facsimile unit 120 over circuit switched network 130 and is routed to communications

server 150 via switch 140. Communications server 150 detects the incoming call signal using trunk interface 152. Operation would continue with block 402.

Continuing with block 402, trunk line interface unit 152, in addition to receives signals to indicate that there is an incoming call from switch 140, also receives signals indicating the circuit destination address of the incoming call. The destination address is captured by trunk interface 152 and is determined by trunk line signaling using mechanisms such as direct-inward-dial, or dual tone multifrequency (DTMF) tones.

Continuing with block 404, to determine whether or not to process the incoming call, processor 151 searches the list of inbound addresses contained in memory subsystem 153 for the destination address. If processor 151 finds the destination address in the inbound address list, processor 151 will then look up the account status for the user who owns the inbound address to determine if the account of that user is a valid user account. In an alternate embodiment, the validation is performed through the use of a database maintained by a separate entity such as database server 195. If the account is found to be inactive, communications server 151 will play a prepared message indicating that the number to which the incoming message was sent is an invalid account.

In block 406, once the validity of the user account has been established, processor 151 will attempt to allocate one fax/voice processing resource from set of fax/voice processing resources 154 and also determine the availability of other resources required

for the receipt and processing of the incoming call. These other resources include the processing capacity of processor 151, the storage capacity of memory subsystem 153.

If it is determined that the appropriate resources are not available, then the call will be routed to a different communications server that is capable of allocating the necessary resources. The routing of calls is accomplished by trunk line signaling via switch 140 and is managed by system management unit 197.

Also, it should be noted that the call will only come from switch 140 to communications server 150 if there are no problems with the line. Otherwise the call will get routed to a different communications server. In the preferred embodiment, fault detection and correction happens in one of two ways. First, on the telephone network side, switch 140 can be set up to independently route a call to another line if it is determined that one of the lines is bad. Second, if communications server 150 detect that the trunk line coming into trunk interface 152 is down, communications server 150 will notify system management unit 197 to reallocate the users for whom communications server 150 is responsible onto another communications server. Thus, system management unit 197 will transfer the duplicate user information contained in database server 195 into a different communications server.

In block 408, communications server 150 "answers" the incoming call by having trunk interface 152 go "off-hook" on the trunk line.

In block 416, trunk interface 152 will terminate the call.
Operation will then continue with block 418.

In block 418, the incoming message, which has been stored as
a temporary file in memory subsystem 153, is processed by
processor 151. In the preferred embodiment, the temporary file is
processed according to the type of the incoming call. If the
incoming call was a fax transmission, then the temporary file,
which has been stored as a group 3 facsimile file, will be
converted into a file which follows the tagged image file format
(TIFF), or a format that is suitable for transmission over WAN
180. Optionally, the temporary fax file can also be compressed at
this stage. If the incoming call was an audio message, then the
temporary file would be compressed using a compression scheme such
as the scheme defined in the global system for mobile-
communications (GSM) standard. In alternate operations,
compressing and other processing of the incoming message is
performed as the same time the incoming message is being received
and being placed in memory subsystem 153.

In block 420, communications server 150 uses the inbound
address to determine the set of final destination addresses, which
are destinations on WAN 180 (i.e., the packet switched network),
to send the processed incoming message. Communications server 150
then sends an electronic mail (e-mail) with the processed incoming
message as an attachment to all the destinations in the set of
final destination addresses.

For example, the e-mail containing the attachment is
transferred to, and stored in, a server such as mail server 160,

The e-mail is then retrieved by client 190 whenever the user wishes. In an alternate embodiment, client 190 can retrieve the e-mail directly from communications server 150, without the storing operation of mail server 160.

5 While the present invention has been particularly described with reference to the various figures, it should be understood that the figures are for illustration only and should not be taken as limiting the scope of the invention. Many changes and
10 modifications may be made to the invention, by one having ordinary skill in the art, without departing from the spirit and scope of the invention.

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CLAIMS

What is claimed is:

1. A method for accepting an incoming message over a circuit switched network and transmitting it over a packet switched network comprising:
 - receiving an incoming call signal along with a inbound address;
 - determining a user account and a final address on said packet switched network associated with said inbound address;
 - allocating a message processing resource;
 - processing said incoming call into a processed message; and,
 - sending said processed message to said final address.

ABSTRACT OF THE INVENTION

1
2 A method and apparatus for accepting an incoming message over
3 a circuit switched network and transmitting it over a packet
4 switched network. The apparatus including means for implementing
5 the steps of receiving an incoming call signal along with a
6 inbound address; determining a user account and a final address on
7 said packet switched network associated with said inbound address;
8 allocating a message processing resource; processing said incoming
9 call into a processed message; and, sending said processed message
10 to said final address.

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DECLARATION AND POWER OF ATTORNEY FOR PATENT APPLICATION

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below, next to my name,

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled

**METHOD AND APPARATUS FOR TRANSMISSION AND RETRIEVAL
OF FACSIMILE AND AUDIO MESSAGES OVER A CIRCUIT
OR PACKET SWITCHED NETWORK**

the specification of which

XXXX is attached hereto.
was filed on April 1, 1997 as
Application Serial No. 08/829,857
and was amended on _____
(if applicable)

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to above. I do not know and do not believe that the same was ever known or used in the United States of America before my invention thereof, or patented or described in any printed publication in any country before my invention thereof or more than one year prior to this application, that the same was not in public use or on sale in the United States of America more than one year prior to this application, and that the invention has not been patented or made the subject of an inventor's certificate issued before the date of this application in any country foreign to the United States of America on an application filed by me or my legal representatives or assigns more than twelve months prior to this application.

I acknowledge the duty to disclose information which is material to the examination of this application in accordance with Title 37, Code of Federal Regulations, Section 1.56(a).

I hereby claim foreign priority benefits under Title 35, United States Code, Section 119, of any foreign application(s) for patent or inventor's certificate listed below and have also identified below any foreign application for patent or inventor's certificate having a filing date before that of the application on which priority is claimed:

<u>Prior Foreign Application(s)</u>			<u>Priority Claimed</u>	
<u>(Number)</u>	<u>(Country)</u>	<u>(Day/Month/Year Filed)</u>	<u>Yes</u>	<u>No</u>
<u>(Number)</u>	<u>(Country)</u>	<u>(Day/Month/Year Filed)</u>	<u>Yes</u>	<u>No</u>

I hereby claim the benefit under Title 35, United States Code, Section 120 of any United States application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application in the manner provided by the first paragraph of Title 35, United States Code, Section 112, I acknowledge the duty to disclose material information as defined in Title 37, Code of Federal Regulations, Section 1.56(a) which

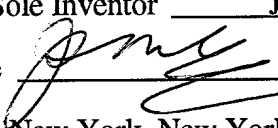
occurred between the filing date of the prior application and the national or PCT international filing date of this application:

(Application Serial No.)	(Filing Date)	(Status -- patented, pending, abandoned)
(Application Serial No.)	(Filing Date)	(Status -- patented, pending, abandoned)
(Application Serial No.)	(Filing Date)	(Status -- patented, pending, abandoned)

I hereby appoint BLAKELY, SOKOLOFF, TAYLOR & ZAFMAN, a firm including: Aloysius T. C. AuYeung, Reg. No. 35,432; William Thomas Babbitt, Reg. No. 39,591; Jordan Michael Becker, Reg. No. 39,602; Bradley J. Bereznak, Reg. No. 33,474; Michael A. Bernadicou, Reg. No. 35,934; Roger W. Blakely, Jr., Reg. No. 25,831; Gregory D. Caldwell, Reg. No. 39,926; Kent M. Chen, Reg. No. 39,630; Lawrence M. Cho, Reg. No. 39,942; Thomas M. Coester, Reg. No. 39,637; Roland B. Cortes, Reg. No. 39,152; William Donald Davis, Reg. No. 38,428; Michael Anthony DeSanctis, Reg. No. 39,957; Daniel M. De Vos, Reg. No. 37,813; Tarek N. Fahmi, Reg. No. P41,402; James Y. Go, Reg. No. P40,621; David R. Halvorson, Reg. No. 33,395; Eric Ho, Reg. No. 39,711; George W. Hoover II, Reg. No. 32,992; Eric S. Hyman, Reg. No. 30,139; Dag H. Johansen, Reg. No. 36,172; Stephen L. King, Reg. No. 19,180; Michael J. Mallie, Reg. No. 36,591; Kimberley G. Nobles, Reg. No. 38,255; Ronald W. Reagin, Reg. No. 20,340; James H. Salter, Reg. No. 35,668; William W. Schaal, Reg. No. 39,018; James C. Scheller, Reg. No. 31,195; Charles E. Shemwell, Reg. No. 40,171; Maria McCormack Sobrino, Reg. No. 31,639; Stanley W. Sokoloff, Reg. No. 25,128; Allan T. Sponseller, Reg. No. 38,318; Steven R. Sponseller, Reg. No. 39,384; Edwin H. Taylor, Reg. No. 25,129; Lester J. Vincent, Reg. No. 31,460; John Patrick Ward, Reg. No. 40,216; Ben J. Yorks, Reg. No. 33,609; and Norman Zafman, Reg. No. 26,250; my attorneys; and Robert Andrew Diehl, Reg. No. P40,992; Sharmini Nathan Green, Reg. No. P-41,410; Thomas A. Hassing, Reg. No. 36,159; Edwin A. Sloane, Reg. No. 34,728; and Judith A. Szepesi, Reg. No. 39,393; my patent agents, with offices located at 12400 Wilshire Boulevard, 7th Floor, Los Angeles, California 90025, telephone (310) 207-3800, with full power of substitution and revocation, to prosecute this application and to transact all business in the Patent and Trademark Office connected herewith.

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

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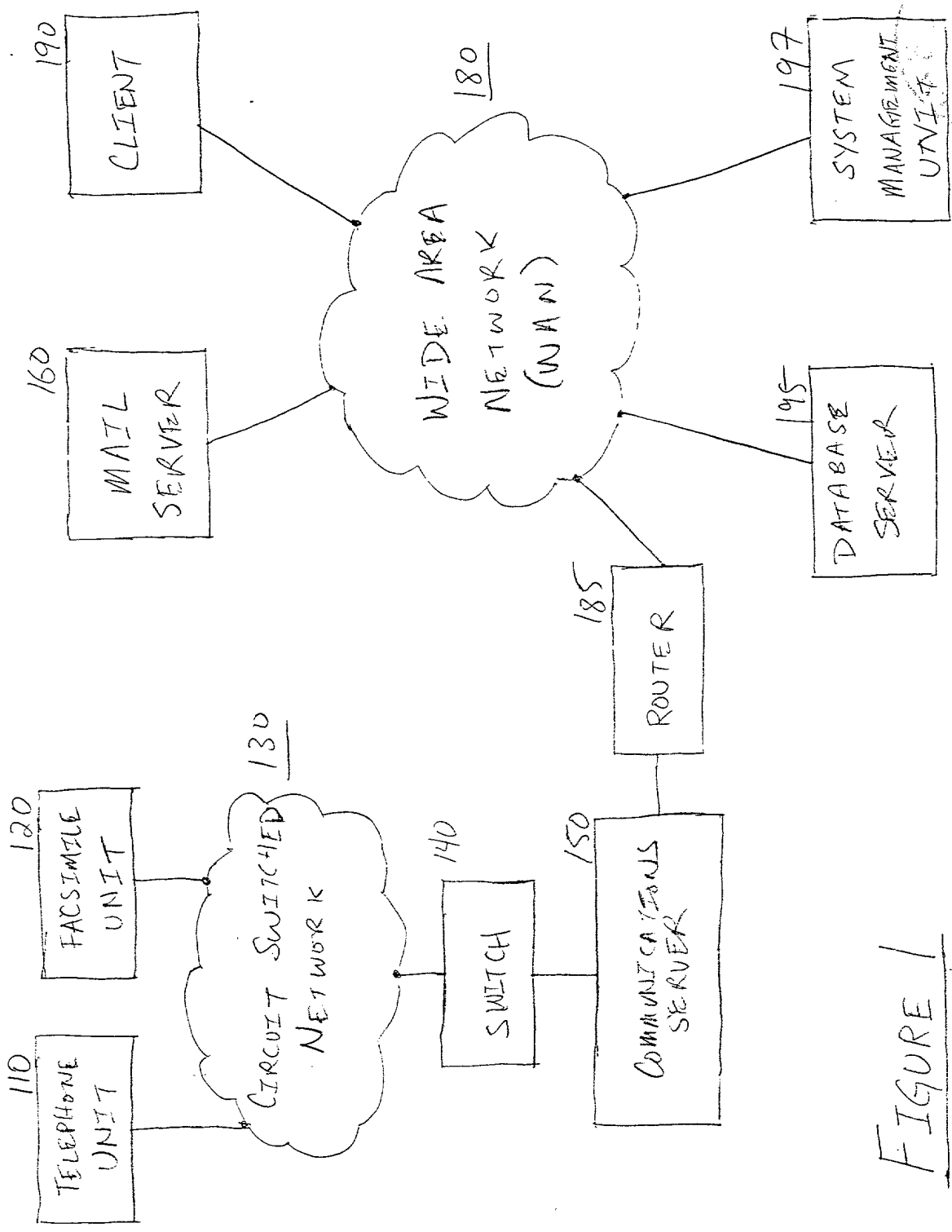
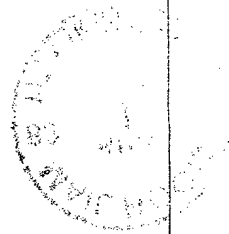


FIGURE 1



COMMUNICATIONS
SERVER 150

SWITCH /
CIRCUIT
SWITCHED
NETWORK
140
130

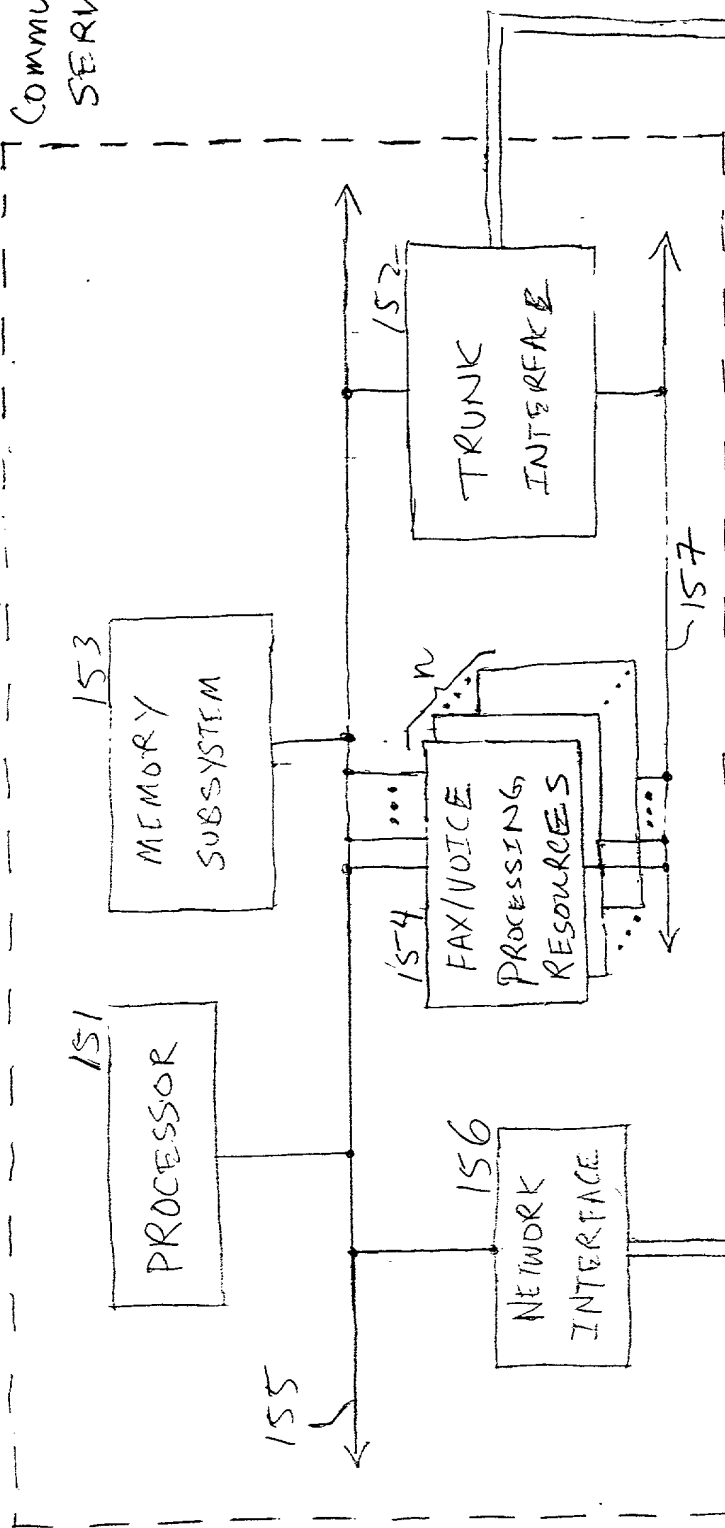
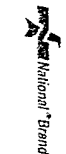


FIGURE 2

ROUTER / WAN
185 / 180



42-301 50 SHEETS 1/2" X 1/2" 5 SQUARE
42-302 100 SHEETS 1/2" X 1/2" 5 SQUARE
42-303 200 SHEETS 1/2" X 1/2" 5 SQUARE
42-304 400 SHEETS 1/2" X 1/2" 5 SQUARE
42-305 800 SHEETS 1/2" X 1/2" 5 SQUARE
42-306 1600 SHEETS 1/2" X 1/2" 5 SQUARE
42-307 3200 SHEETS 1/2" X 1/2" 5 SQUARE
42-308 6400 SHEETS 1/2" X 1/2" 5 SQUARE
42-309 12800 SHEETS 1/2" X 1/2" 5 SQUARE
Made in U.S.A.

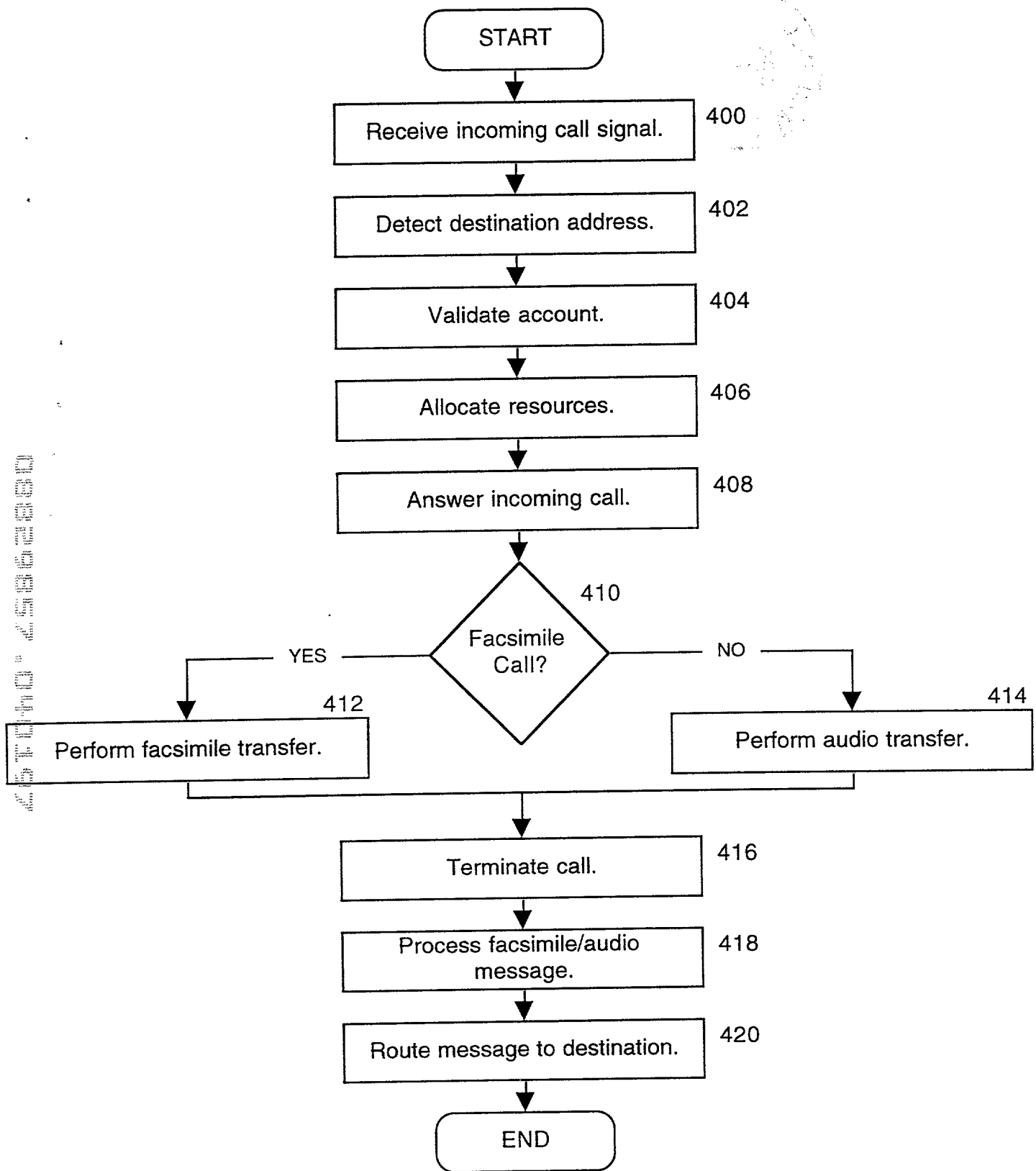


Figure 3